

## CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 20 March 2003 with an application for Letters Patent number 524863 made by Smith Caulfield Limited.

Dated 23 September 2003.



Neville Harris  
Commissioner of Patents, Trade Marks and Designs



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**PROVISIONAL SPECIFICATION**

**Improvements In Hidden Connection Arrangements For Elements**

We, Smith Caulfield Limited, A New Zealand Company of  
Address: 323 Waiau Pa Road, Waiau Pa, Pukekohe, New Zealand  
do hereby declare this invention to be described in the following statement :

## IMPROVEMENTS IN HIDDEN CONNECTION ARRANGEMENTS FOR ELEMENTS

### FIELD OF INVENTION

The present invention is directed to a mechanical connection arrangement which allows for the hidden attachment of members and elements which may be at least partially, or substantially, hollow. Preferred applications of the present invention are for the assembly of shower enclosures and bathroom partitioning, and particularly where the attached elements may contain plumbing, valves (including thermostatic and mixing valves, and faucets), and/or electrical and other services.

### BACKGROUND DESCRIPTION

While the present invention has a number of potentially realisable applications, it is with problems associated with the bathroom industry that the present invention was developed. More specifically, it was with the problems associated with the installation of shower enclosures and other partitioning (e.g. partitions and doors around showers, shower receptors (trays) baths and spas etc.) in mind that the present invention was developed. Also installation, which are commonly practised in different countries and regions.

For instance, the US and European markets demonstrate two substantially different sets of trade practices for the installation of bathroom structures such as shower receptors. One particular difference is how the plumbing and waste outlets are routed to the shower receptor and enclosure in the two countries. In Europe, the norm is for all plumbing and waste pipes to be installed above floor level. A removable access panel is usually provided which allows access to the underside of the receptor for the connection of services such as plumbing and drainage.

In contrast, the US market generally routes plumbing and waste conduits within the floor itself, meaning that waste pipes etc. are cast or positioned within the floor. The US methodology reflects a preferred installation of a shallow shower receptor with the sill or front skirt directly on the floor, acknowledging a consumer desire for the step into the shower enclosure to be as low as possible. There is no comparable access panel, as for the European market, and this is also reflected in differences in the type of waste traps, and how the various plumbing may be routed and connected. The shallow nature and limited access

under the receptor makes it difficult for subsequent tradesmen to attend to the connection of plumbing elements (under the receptor or within recesses on its underside) once the receptor has been installed. This problem becomes apparent when considering the commonly practiced procedure for shower installation in the US and a number of other countries.

A typical procedure for a US installation follows the sequence:

- (i) the builder roughs out the position of the tray and installs the tray,
- (ii) the plumber connects the waste and terminates the supply plumbing (behind the wall),
- 10 (iii) the builder completes the shower installation, including installing wet-wall linings and sealants,
- (iv) the tiler may tile the enclosure, and
- (v) the plumber returns to complete all remaining plumbing (in front of the wall)

The initial installation of the receptor makes it difficult for subsequent tradespersons who may not be present at that time. With such a high involvement of different tradespersons it becomes difficult to ensure the co-operation necessary to provide for the timely and professional installation of shower enclosures. This also imposes limitations on what is achievable, particularly for design considerations affecting the routing and connection of associated plumbing within the installation.

20 The greater access associated with European design and practice eases the requirements for co-operation between the varying tradespersons. This is as opposed to many other countries, such as the United States, where tradespersons tend to perform their specific tasks individually and somewhat independently. Accordingly, for the US, it is not unusual for the tradesperson installing the partitioning and attending to the final connection of plumbing to arrive on site at the stage where the wall finishing (for wall and corner showers) are in place, and the shower receptor or flooring (e.g. showers with tiled floors) are also substantially completed. Any plumbing at this stage is virtually restricted to provided holes in the wall rather than on the underside of the receptor or through the floor.

A difficulty which also presents itself to the tradesperson is how to erect fittings such as supporting columns, elements, and other fixtures without damaging or dismantling

substantially finished surfaces. Attempting to fix vertical members to a floor has been a difficult task and usually results in a visible mechanical connection, or increasing reliance to be placed on overhead or wall connections. Furthermore, many mechanical attachment techniques make the basal routing of plumbing to such vertical members virtually impossible or impractical and for this reason the routing of plumbing to vertical elements (which may contain horizontally directed body jets) is almost exclusively from overhead or wall outlets. Attempts to route plumbing under shallow shower trays sitting on the floor also present difficulties as it is difficult to subsequently connect and redirect such plumbing to vertical elements which can duct the plumbing to where needed. Market preference is directed towards as shallow a tray as possible, so as to avoid a step up into the shower, and hence problems associated with routing plumbing hidden under a tray is becoming more of an issue.

There are thus a number of problems facing the industry. These problems include:

- Providing a connection system for vertical elements and members which is substantially hidden or invisible after installation;
- Providing a connection system which allows for the accurate positioning and placement of vertical or other elements, particularly for attachment to finished or partly finished surfaces;
- Providing a connection system which readily allows for plumbing or other services to be routed to within, and connected to, the element or member;
- Providing a connection system which allows for connection of the element or member in a quick and easy fashion;
- Providing a connection system which affords some mechanical strength and resists disconnection;
- Providing a connection system which allows the element or member to be connected to a variety of different surfaces and finishes including (but not restricted to) metal, porcelain (both solid ceramic and coated), plastic, laminate, composite, tile, cement, masonry, various types of wall partitioning, suitable bath tubs, and shower receptors, etc.

- Providing an easy to use system which allows for the basal routing of plumbing under structures such as shower receptors or base surrounds and to redirect this up into subsequently attached vertical elements.

It is therefore an object of the present invention to consider the above problems and provide at least one solution which addresses a plurality of these problems. Ideally the present invention will also provide a connection system which allows for the substantially trouble free installation of varying supporting elements and members associated with shower and bathroom structures, and which optionally may also include allowance for the connection and routing of plumbing and other services. Ideally the connection system is suitable for use on finished surfaces.

#### GENERAL DESCRIPTION OF THE INVENTION

Further objects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

In one respect the present invention may be described as a connection system consisting of engaging portions, one of which portions is associated with a member to be attached to a surface or structure, and the other portion attachable to said surface or structure (which may be during or post-construction depending on the embodiment), and which portions preferably interact and engage with a partial rotational (and preferably bayonet type) action. Preferably the connection arrangement is substantially hidden, except by user choice, when the member is ultimately attached to the surface or structure by engagement of the portions. Preferably one portion can be considered a cam or cam-like arrangement which interacts with the second portion which can be likened to an annular sleeve. The components are preferably hollow or have removed portions to allow plumbing or services to pass from the surface (or structure) through to the building element being attached and which element may be pre-plumbed and/or pre-wired.

According to one aspect of the present invention there is provided an interacting arrangement of components for the connection of a building element to a surface and providing for services to exit the surface and enter the attached building element, the interacting arrangement including:

- a first cam-like engaging portion and a complementary annular-like engaging portion which interact with each other in a partial rotational connection arrangement;
- one of the engaging portions being positionable at the attachment point on the surface, and the other positioned at the end of the building element to be attached to the surface;
- the engaging portions being configured to allow for services to pass axially therethrough;
- the arrangement defined such that then the building element is attached to the surface, any said services and the cam portion are substantially shielded from view from the exterior.

According to one aspect of the present invention there is provided an interacting arrangement of components for the connection of a building element to a surface, substantially as described above, in which the partial rotational engagement consists of a bayonet type action as defined herein.

- 15 According to a further aspect of the present invention there is provided an internally pre-plumbed pillar for use in a shower or bath enclosure which is modified for attachment to a substantially finished surface, the pillar comprising:
- a body with hollow interior housing said plumbing, and including at or near the end of attachment a terminated section of plumbing in turn comprising an extendible
  - 20 length of pipe or tube biased to retract to within the body;
  - there being provided at or near the end of the body an engaging portion complementary to a separate engaging portion fixable to said surface, and which interact to securely connect the pillar to the surface to which the separate engaging portion is fixed;
  - 25 - both engaging portions including removed sections allowing said plumbing to pass therethrough, and wherein one engaging portion substantially accommodates the other within when connected such that the plumbing and connection is substantially hidden from view when the pillar is attached to the surface.

30 The present invention includes many aspects and variations. While initially developed to provide means for the simple after-installation of supports and pillars for shower, spa, and bath enclosures during building construction or renovation, and in a manner where the

connection was hidden, the principles lend themselves to a variety of embodiments which can help accommodate a greater range of user choice during design, or modification of existing components to take advantage of the present invention. A consideration was also the ability to route services such as plumbing or wiring into these pillars or supports when  
5 necessary, and thus the present invention considers the situations where such services may, or may not, be present. Variations of the invention will be described, with a summary of some of the variations considered to be within the scope of the invention following:

According to a further aspect of the present invention there is provided a method of attachment for a building element, said method consisting of:

- 10 i) providing on the attachment end of the building element (as herein defined) a first engaging portion which is configured to engage, as a consequence of at least relative rotation, with
- ii) a second engaging portion which is able to be affixed to the surface to which the building element is to be connected,
- 15 with attachment being achieved in a partial rotational, and preferably bayonet type, manner consisting of components of both linear translation of the first engaging portion relative to the second engaging portion, and rotation, and wherein one of the engaging portions includes a cam-like portion and the other engaging portion includes a complementary annular-like portion.
- 20 According to another aspect of the present invention there is provided the method of attachment described above in which the cam portion comprises a disc-like portion with which at least one engaging portion of the building element interacts.

According to another aspect of the present invention there is provided the method of attachment described above in which a said engaging portion of the building element  
25 comprises a sleeve or annular portion.

According to another aspect of the present invention there is provided the method of attachment described above in which the cam portion includes a plumbing connection, or means for including a plumbing connection, to which a water pipe or the like can be connected.



According to another aspect of the present invention there is provided the method of attachment described above in which the cam portion includes provision for allowing it to be affixed to a surface in a precise manner, allowing the building element to be precisely positioned in relation to the surface when attached.

- 5 According to another aspect of the present invention there is provided the method of attachment described above wherein a surface comprises at least one of: a floor, a shower receptor, a bath tub, a partial wall structure, a wall, a surround, a horizontal support surface, an inclined support surface, and a vertical support surface.

- 10 According to another aspect of the present invention there is provided the method of attachment described above in which the building element is in, after attachment to the cam portion, a substantially vertical, horizontal, or angled position, or possessing components of one or more thereof.

- 15 According to another aspect of the present invention there is provided the method of attachment described above in which said building element houses plumbing, and where the plumbing within the building element is modified such that its end, closest to the end of the building element being attached, is either or both flexible and extendible so as to be able to be temporarily withdrawn from the end of the building element to allow attachment to a plumbing connection associated with the cam.

- 20 According to another aspect of the present invention there is provided the method of attachment described above in which the cam portion includes one or both of an aperture, and removable portion providing an aperture, through which services may pass, said services including but not restricted to plumbing, and electrical conduits or carriers.

- 25 According to further aspect of the present invention there is provided a method for attaching a building element (as herein defined), forming part of a shower assembly, to a support surface, said method including:

- i) fixing a first engaging portion, such as a cam member to said support surface, and where said building element houses plumbing, including a plumbing connection into the cam fixture,

- ii) providing a complementary second engaging portion, such as an annular connection portion on the end (to be connected) of the building element, said second engaging portion capable of engaging with the complementary portion in a partial rotational engagement, and preferably bayonet type, action and which restricts or prevents longitudinal movement of the hollow member when so engaged,
- iii) modifying the internally housed plumbing within the building element to have an end portion which can be extended from within the housing to allow for connection, should the plumbing end portion not already be configured in this manner,
- iv) bringing the end of the building element into proximity with the cam fixture and, if present, connecting internal plumbing to the plumbing connection,
- v) sliding the annular connection portion and end of the building element over the cam fixture, and rotating so as to engage.

According to further aspect of the present invention there is provided a method for attaching a building element (as herein defined), forming part of a shower assembly, to a support surface, said method including:

- i) fixing a first engaging portion, such as a cam member to said support surface, and where said building element houses plumbing, including a plumbing connection into the cam fixture,
- ii) providing a complementary second engaging portion, such as an annular connection portion on the end (to be connected) of the building element, said second engaging portion capable of engaging with the complementary portion in a partial rotational engagement, and preferably bayonet type, action and which restricts or prevents longitudinal movement of the hollow member when so engaged,
- iii) modifying the internally housed plumbing within the building element to have an end portion which is substantially rigid and to be so terminated as to form part of a quick connect type arrangement,
- vi) positioning the end portion and end of the building element over the affixed first engaging portion, and rotating so as to engage, the positioning action also resulting in connection of the terminated end plumbing portion within the building element to a suitably terminated plumbing portion associated with the affixed engaging portion.

According to further aspect of the present invention there is provided a method for attaching a building element (as herein defined), substantially as described above, in which the quick

connect type arrangement consists of at least one of a: commercially available quick connect system for pipe sections, a push-lock connector such as the "John Guest" type for receiving an end pipe section, a push-fit type connection arrangement for pipe sections, an O-ring type push-to-connect type arrangement, a male and female type push-connect arrangement, or less preferably an olive and nut type connection arrangement.

According to another aspect of the present invention there is provided the method of attachment described above in which the cam portion includes provision for allowing it to be affixed to a surface in a precise manner, allowing the building element to be precisely positioned in relation to the surface when attached.

10 According to another aspect of the present invention there is provided the method of attachment described above in which the building element is in, after attachment to the cam portion, a substantially vertical, horizontal, or angled position, or possessing components of one or more thereof.

15 According to another aspect of the present invention there is provided the method of attachment described above in which said building element houses plumbing, and where the plumbing within the building element is modified such that its end, closest to the end of the building element being attached, is either or both flexible and extendible so as to be able to be temporarily withdrawn from the end of the building element to allow attachment to a plumbing connection associated with the cam.

20 According to another aspect of the present invention, there is provided the method of attachment described above in which the building element is substantially a hollow member (as herein defined).

25 According to a further aspect of the present invention there is provided a method of installation of a shower enclosure which includes one or more building elements which may either or both support other elements of the enclosure, and house plumbing associated with the enclosure, said method including:

- i) positioning and fixing to the floor or base structure, cam portions forming part of the attachment for the building element,

- ii) subsequently, concurrently, and/or prior to step (i), attending to connection of any plumbing leading to the cam fixture, other than that housed within the associated building element,
- 5    iii) bringing the end of the building element into proximity to the cam fixture and, if present, connecting the free end of any plumbing housed within the building element, and
- iv) affixing the building element to the cam fixture by engagement of an annular engaging portion present at the end of the building element.

10    According to another aspect of the present invention there is provided the method of installation of a shower enclosure as described above in which the floor or base structure is substantially finished prior to the positioning and fixing of the cam portions.

15    According to another aspect of the present invention there is provided the method of installation of a shower enclosure as described above in which a floor of a building forms a floor for the shower enclosure, the method including the positioning of waste pipes and plumbing in the floor and terminating substantially at the floor level, and where the floor is substantially finished prior to installation of said building elements which are preceded by the positioning and fixing of the cam portions; and where plumbing is optionally routed, where appropriate, to or through the cam portions to be connectable to plumbing within the building elements.

20    According to another aspect of the present invention there is provided the method of installation of a shower enclosure as described above in which plumbing supplied to said building elements, and the engagement means for the building element including the cam portion, are substantially not visible after the building element has been engaged.

25    According to a further aspect of the present invention there is provided a connection assembly for use in the attachment of building elements, said assembly allowing provision for the connection of plumbing when present within said building elements, said assembly including a cam portion able to be fixed to an existing structure or surface to which the building element is to be attached; the assembly also including a complementary annular portion which engages with the cam portion so as to restrict longitudinal separation of one

from the other; the arrangement being further characterised in that the annular portion is either formed into the building element or is fixable thereto.

According to another aspect of the present invention there is provided the connection assembly described above in which the cam portion includes at least one of:

- 5 i) a plumbing connection for the connection of plumbing within the building element to allow its connection to at least water supply plumbing;
- ii) an aperture allowing for plumbing, electrical, or other services to pass through;
- iii) a removable portion allowing for options (i) or (ii) when required
- iv) a mechanism for restricting rotation of the cam portion.

10 According to another aspect of the present invention there is provided the connection assembly as described above in which complementary plumbing connections are provided on both the cam portion and plumbing associated with the building element, said connections consisting of a quick connect type of arrangement.

According to a further aspect of the present invention there is provided a building element  
 15 (as herein defined) which is hollow along at least part of its length for use in a connection assembly, said building element including an extendible plumbing extension portion comprising a flexible and/or extendable section of pipe which can be drawn from within the interior of the building element and free of the end of the member to allow connection to a plumbing fitting, said extendible plumbing extension portion being attached or attachable to  
 20 other plumbing components associated with the building element.

According to another aspect of the present invention there is provided the building element described above in which the extendible plumbing extension portion consists of a retractable (to within the interior of the building element) section of pipe which is biased to retract to within the hollow section.

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According to another aspect of the present invention there is provided the building element described above in which connection for the extendible plumbing extension portion allows for at least partial rotation of the extendible plumbing extension portion relative to the plumbing fitting.

According to another aspect of the present invention there is provided the building element described above in which the extendible plumbing extension portion consists of a flexible coil of pipe, which may be of metal, non-metal, or part-metal construction.

5 According to another aspect of the present invention there is provided the building element described above which includes one or more jets, nozzles, or connections therefor, positioned in a sidewall.

10 According to another aspect of the present invention there is provided the building element described above which includes, or provides for the connection of at least one of: a hand-held water delivery unit (such as a hand shower), a fixed head water delivery unit, and plumbing to an overhead shower or other water delivery unit.

According to another aspect of the present invention there is provided the building element described above which is pre-plumbed.

15 According to another aspect of the present invention there is provided the building element described above in which engagement portion and building element are configured such that the cam portion is substantially hidden within the interior of the hollow member after engagement.

20 According to a further aspect of the present invention there is provided a cam portion for use in a connection assembly as described above, said cam portion comprising a disc-like portion, and wherein portions of the disc may optionally be absent, able to interact with an engagement portion in such a manner that engagement may occur after the cam portion has been affixed to a surface.

According to another aspect of the present invention there is provided the cam portion described above in which there is included fixing means, or provision for the use of separate fixing means, for affixing the cam portion to a surface.

25 According to another aspect of the present invention there is provided the cam portion described above in which, when affixed, the disc-like portion is raised slightly above or clear of the surface to which the cam portion is attached.

According to another aspect of the present invention there is provided the cam portion described above, the cam portion including raised elements to assist in the positioning of the hollow member.

5 According to another aspect of the present invention there is provided the cam portion described above, in which the cam portion includes an attached or integrated pipe connection.

10 According to another aspect of the present invention there is provided the cam portion described above which includes rotation resisting means which interacts with features on the engagement means associated with the building element to resist disengagement and/or rotation.

According to another aspect of the present invention there is provided the cam portion described above in which the rotation resisting means comprises part of at least one of: a ratchet type arrangement, a full locking arrangement, or more preferably a detent arrangement.

15 In the broader sense, the present invention provides for the attachment of a member or element to a surface, and preferably in a manner where the means of attachment or fastening is substantially hidden. The present invention will typically also be suitable for use in applications where there is limited or nil access to the interior or underside of the existing surface or structure to which the element or member is to be attached – such as when the  
20 surface has been finished. Preferably the method also allows for the option of fixing, casting, or integrating components associated with the method into the surface (or underlying structure) at the time of surface preparation or finishing, as well as providing embodiments which will allow for implementation of the method to an already finished or substantially finished surface or structure.

25 While the present invention may take a number of forms, it is with the problems associated with showers and bathrooms in mind that the present invention was developed. Accordingly the description will, for the sake of simplicity, be substantially directed to such applications. It is envisaged that the skilled addressee will be able to implement various embodiments in

different manners, and for use in different applications, when armed with the description given herein.

Preferred embodiments of the present invention provide a method for the attachment of a building element, which may be substantially hollow, to an existing surface. Typically such building elements may comprise a support element, with one preferred type of member constituting a vertical supporting member for a shower or bath enclosure, and to which other panels may be attached. However, preferred embodiments also include the instance where substantially free standing elements are provided. Quite often these elements or members are substantially vertical in orientation though the present invention also includes instances where these may be inclined (with respect to the vertical), or horizontal.

A number of terms will be referenced within the description to be given. It is known that different countries adopt different terminology for common items. This is particularly true in the building and construction trade, and for this reason the following glossary is given to more precisely define the intentions of the inventor.

#### 15 Glossary of terms used:

- |    |                  |  |
|----|------------------|--|
| 20 | cam portion      | an element, which may have a removed centre section, having features which can interact to engage with a complementary engaging portion (see annular attachment portion) typically associated with the hollow member. The preferred form of the cam portion is disc-like – at least in the general section interacting with the complementary engaging portion. A preferred form resembles the cams used in the mechanical control of sewing machines, i.e. substantially biscuit shaped. However the cam portion can take many other forms. |
| 25 | cam fixture      | the cam portion when fixed to a surface or structure, and which fixture may include any plumbing connectors when appropriate.  |
|    | building element | the element which one wishes to attach to a structure or surface. Often the building element is a hollow member (see below). The building element may consist of more than one component can   |



include an assembly of components. For many applications the building element may be a post or like component for in a shower cubicle or partition. It may sometimes be a horizontal member such as a rail or part of an overhead support structure. The building element may also have various associated components and services pre-installed or pre-assembled.

#### hollow member

typically, but not necessarily, an upright element which may optionally house plumbing and wiring etc. Typical hollow members form part of bathroom (or like) structures such as bath, spa and shower enclosures. These may be of varying cross-sections (which may not be constant along their length), and often (but not always) adopting circular, oval, and "D"-shaped cross-sections – see below for open configurations.

The hollow member is a member with at least one internal cavity which may extend only partly or substantially fully along the length of the member. The member may be a closed hollow member (where only access to the cavity is via the ends) or an open hollow member where the cavity may be accessible at other points along the length of the hollow member. The hollow member may not be completely closed along its whole length – e.g. a 'C'-shaped, "U"-shaped, or 'V'-shaped member – and such members may interact with other walls or elements to further close the cavity once installed. As mentioned above, the cavity may also be present only along part of the length of the member, the member being solid or filled at other points. However, the hollow portion should be present at at least one end where connection to the cam portion is to be made.

#### plumbing

typically pipes and conduits for carrying water, waste, or other fluid but, when within a hollow member, are most commonly

pipes for water to be supplied to jets and nozzles, faucets, shower roses etc.

plumbing connector

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a connection for plumbing, e.g. a pipe connection. May include elbows, and junctions. Different types of connectors may be considered, though push-fit and quick-connect types are preferred, such as John Guest push-fit connectors. Preferably the connectors allow for at least partial rotation of the connecting portions after connection has been made – allowing for rotation associated with the preferred bayonet type coupling action of the cam portion and its complementary engaging portion.

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engage by partial rotational engagement in which there is included, as part of the action required, a rotational action. By partial is meant that rotation is only part of the relative movement of the engaging portions when they are brought together and set to an engaged position. A preferred example of partial rotational engagement is the bayonet type action defined below. Preferably the relative rotation is less than  $360^\circ$ .

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bayonet type action

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In a bayonet type action there is both linear and rotational components in the relative movement of the engaging members when they are brought into proximity and set into an engaged position (typically resisting at least longitudinal or linear withdrawal). There are three preferred forms of bayonet type action according to the present invention. The first is a 'flat bayonet action' where overlapping components of the engaging components only start to overlap with each other when rotation occurs after linear positioning. The second is the typical 'light bulb type' bayonet action where a guide element substantially prevents or limits relative rotation until linear positioning is completed. The third type is a 'helical bayonet action' in which rotation introduces a linear component to the relative movement

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of the engaging portions – such as drawing one portion down into the other. Reference is made to drawings later herein.

translational movement      a linear or sliding movement, as opposed to a rotational movement. The bayonet action can be described as a translational movement followed by rotation.

at the end      typically used in relation to the annular attachment portion 'at the end' of the hollow member or building element. In this context 'at the end' means provided in a manner allowing the hollow member to be connected at its end. The annular attachment portion may therefore be fixed or formed on to the end of the hollow member (and thus be visible from outside) or housed internally within the member such that it is not externally visible. Hence 'at the end' should be read 'at or near the end'.

annular attachment portion      also referred to as the 'engaging portion' will be an element or assembly which is preferably annular or ring like in overall appearance, but need not necessarily be so. The term annular more functionally describes the fact that this portion engages about the cam portion. Sleeves and hollow cylinders fall within the definition.

Whirlpool      in some countries being a generic term which includes jetted baths with an associated pump for air and/or water, and in some countries referred to as a spa. The terms 'whirlpool' and 'spa' will be taken to be equivalent when used herein.

The present invention preferably utilises interacting 'cam' and 'annular' engaging portions to effect a connection. In preferred embodiments the annular portion is associated with the building element while the cam portion is associated with the surface structure at the point of attachment (of the building element). It is, however, envisaged that this association can be reversed such that the cam portion could be associated with the element, and the annular engaging portion with the surface or structure. The same principles of interaction and general design as discussed within this specification are applicable. It is considered that the

skilled tradesperson, when armed with the description herein, will be able to implement such reversed embodiments of the invention from the description of the preferred embodiments. Accordingly, for simplicity and to avoid confusion, the remainder of the specification will largely refer to orientation of the preferred embodiments.

5 Preferred embodiments of the invention make use of a cam portion which, in the normal method of performing the method of the invention, is attached to the surface to which the building element is to be attached. The method of fixing is typically by either or both mechanical and adhesive fastening. Mechanical fastening methods include screwing, bolting, and various equivalents and alternatives thereof. A variety of suitable construction adhesives  
 10 are known and these may be used instead of, or in conjunction with, other mechanical fastening means. As a further variation, the cam portion may be formed, integrated, or cast into the surface at the time of its construction. For instance, a modified cam portion may be used which is positioned into cast concrete flooring. This may include a suitable anchor portion which is embedded in the concrete. It may also include distancing means so that the  
 15 engaging portion of the cam is positioned above the floor surface. This may also take into account any floor finishing, such as tiles, which may be subsequently laid or put into place before attachment of the hollow member or element.

The cam portion will typically, in addition to means for fastening to the surface, include an engagement portion which can be disc-like in configuration, or include a central body  
 20 portion with outwardly extending features or projections. This disc or body portion may also include removed portions which extend to or from the periphery of the disc or body. Apertures may also be provided within the disc or body though this will be discussed later with reference to allowing services to pass through the cam portion. In other variations multiple disc-like or repeating body portions may be provided and these may also have  
 25 similar or dissimilar configurations. It is envisaged that the provision of two or more axially displaced co-axial disc-like or repeating body portions can improve the strength of the resulting attachment of the building element to the surface though will typically also increase fabrication costs.

Preferably the disc-like (or alternate configurations of the )engagement portion will be  
 30 positioned away from the surface to allow engagement with the attachment end of the building element to occur. Such spacing may be provided in a number of manners including

the provision of one or more stem portions, spacers, and/or body features. Whether services are to pass through the cam portion will also influence the specific body design.

In summary, most cam portions according to preferred embodiments of the present invention will include an engagement portion, which is preferably disc-like in appearance (though may have removed portions), an affixment portion allowing it to be affixed to the surface, and a spacing portion which distances the engagement portion from the surface. Other features may be provided including positioning pins, features, or indentations to allow for the more ready alignment and/or positioning of the cam portion with respect to the surface. This becomes particularly important for cam portions used for the attachment of pillars which may have features present for the attachment of panels or doors. In this case accurate alignment of the cam portion (which will also influence the rotational alignment of the attached member) is as important as the correct positioning of the cam portion on the surface.

It should be appreciated that the cam portion may comprise a single piece, or be constructed of separate components. The cam portion may be made of a number of materials including suitable plastics, metals, and composites which typically have properties of stiffness and rigidity, as well as strength commensurate to the task. Resilience is not normally a requirement except where this forms part of or contributes to the prevention of or resistance to rotation of the attached element with respect to the cam portion, or to resisting its removal therefrom. A certain amount of resilience in some components can also allow for greater tolerances in manufacturing, with deformation by component resilience compensating for too tight a tolerance. However the preference is for accurate and precise manufacturing.

To interact with the cam portion is provided an engaging portion. This may be a separate element or elements attached to the building element to be subsequently connected, or alternatively formed into the building element during its fabrication. When separately attachable engaging portions are provided, adaptors may be provided to allow its attachment to a hollow end portion of building elements of different internal configurations. This will increase the versatility of the present invention, and thus allow a single cam and insert (engaging portion) set to be used on a variety of differently configured hollow member building elements. Any means of attaching the engaging portion to the building element (including mechanical fastening, adhesive fastening and/or mechanical interaction between parts) should ideally be hidden from exterior view.

In the context of the present invention the building element (to be attached) need only be hollow in the vicinity of where engagement with the cam portion occurs. In this case the remainder of the member may be solid or filled. However, for the types of applications provided herein, provision needs (in most cases) to be made for services such as plumbing, electrical wiring, etc. to pass through the attachment arrangement and also the building element to be attached. This will be discussed in more detail later.

Typically the engaging portion (associated with the building element) will substantially encircle the cam portion when fitting and attachment occurs. Accordingly the engaging portion may be sleeve like, with the sleeve often being represented by the interior wall of an insert, or the interior wall of a hollow member building element itself. Typically inwardly directed features are provided on the inward face of the engaging portion to interact with removed portions in the engaging portion of the cam.

For the present invention the preferred method of attachment results from a partial rotational, and preferably bayonet type, action between the engaging portion and cam portion. More specifically, this represents axial sliding of the engaging portion over the cam portion, followed by subsequent partial rotation. After rotation, features on the engaging portion and/or cam portion interact (usually overlap) to prevent the two portions from becoming axially separated. If removal is allowed, then a reversal of the bayonet type fitting action will be required. In preferred embodiments however, rotation resisting features may be provided to prevent or resist one or more of these actions. A variety of rotation resisting mechanisms are known in the trade, including detent, ratchet, and similar mechanisms. One or more of these may be employed (for instance) to help lock the engaged component, or to resist release and separation.

When multiple disc-like or repeating body portions are provided on the cam portion, it is possible that the partial rotational action may be provided in respect of all the disc-like or repeating body portions. However, it is also possible that some of the disc-like and repeating body portions may not necessarily so engage. Instead they may merely serve to increase the relative strength of the attachment, so as to resist pivoting of the building element about the cam portion by increased surface contact between the components (at different points along the length of the member).

Accordingly, in preferred embodiments of the present invention there is provided a cam portion which is fixable to a surface, and an engaging portion which may be inserted or formed into a building element. The two portions may be engaged through, preferably, a bayonet type action which involves relative sliding and rotation of the member (and associated engaging portion) over the cam portion. Providing that the engaging portion is suitably positioned within the interior of the building element to be attached, the result is an attached member with virtually no, or substantially no, visible evidence of the connection arrangement except by user choice.

Modifications may also be made to the arrangements of the invention such as by the provision of seals to help seal the base of the building element against the ingress of water or foreign material. These seals may be substantially invisible, or intended to be visible, in the attached assembly. These may be separate annular type members which are positioned over the cam portion (like a washer) prior to the attachment of the building element. Alternatively these may also form part of the cam portion.

Other cam portions may be configured so that the building element to be attached will, instead of being substantially perpendicular to the surface to which the cam portion is attached, be aligned at a predetermined angle to the perpendicular. This increases the versatility of the system, and the manner by which it may be used. These variations are also likely to find more use for the attachment of the building element to walls, and vertical and inclined surfaces other than just floors. An adjustable unit in which the resulting angle can be adjusted by movement and subsequent locking or tightening of the component can be considered.

It is envisaged for most applications that plumbing or other services will need to be routed from to a wall or floor structure (to which the cam portion is to be attached) and to the building element. In this case the building element is typically substantially hollow along its length to allow the provision of internal plumbing and services. The problem which is then introduced is how to allow for these services (or plumbing) to pass through the attachment arrangement, and also how suitable connections (for the plumbing or type of services) can be made in situ at the time of attaching the building element. Ideally this attachment should not interfere with the substantially hidden nature of the arrangement once the building element is

attached. Further, the method of attachment of the services and plumbing should not interfere with the attachment mechanism and be able to cope with a bayonet type attachment operation. Most preferably, the arrangement should also be able to cope with situations where the building element may be pre-wired, or pre-plumbed etc. However, not all  
5 embodiments of the present invention take into account this option. Some variations of the present invention which deal with these issues will now be discussed.

The present invention is adaptable to allow services to pass from an existing structure ( or below a surface) to within the building element to be attached. While this could be accomplished in a number of ways, the preferred arrangement is to provide an aperture or  
10 removable portion allowing various services (including plumbing) to pass through the cam portion. This may be accomplished by the provision of one or more apertures in the engagement portion and any appropriate portions of the cam portion. Slots and removed portions are also possible. Removable 'knock-out' portions may also be provided so that the apertures are only present when required.

15 In a preferred embodiment there is a substantially centrally positioned aperture through which plumbing from the existing structure/surface can penetrate. This should be of sufficient dimension to allow the appropriate plumbing and/or other services to pass through. In practice, for plumbing, a cut off section of the pipe may protrude from the surface to which the building element is to be attached. The cam portion can then be positioned over  
20 this cut off portion of pipe. Ideally the aperture and/or other removed portion of the cam should be larger than the outside diameter of the pipe. This will allow some provision for movement of the cam portion with respect to the pipe so that the cam portion can be precisely positioned and located, even if the pipe is not. Typically at the next stage the pipe will be terminated with an appropriate fitting or modification made to allow the plumbing  
25 from within the member to be connected. It is also possible that the suitable terminating connector can be integrated into the cam portion so that other plumbing from the member may be directly connected to the cam portion itself. However, not all types of plumbing, plumbing connection systems, and situations may allow this particular variation. It is envisaged that more often than not (currently) a separate connector piece will be attached to  
30 the free end of the cut off pipe section.



Typically next, the connecting end of the building element will be brought into proximity to the cam portion which by now should have been secured to the surface. Taking the case of a pre-plumbed element, it is desirable that the internal plumbing can be extended free of the end of the building element so that connection can be made with the terminated plumbing associated with the cam portion. This is especially true for connection systems which may require a tool such as a spanner to complete the connection. However, there are also quick-to-connect and push-fit connection systems available which may be employed with the present invention. Providing suitable guidance, for alignment of the various components, is provided it is possible that adequate connection of plumbing sections can be completed by merely pushing the building element over the cam portion in order to complete the bayonet fastening arrangement. In such cases it will not be necessary to pull the internal plumbing section free of the end of the building element. However it is generally desirable that some visual confirmation of a secure connection can be made and thus it is envisaged that this would not normally be a preferred embodiment except where visible inspection and/or adjustment can be made through the wall of the building element itself. This is not a desirable arrangement as it complicates the fabrication process for the member, and also disturbs the aesthetics and smooth finish of most elements used in bathroom structures.

In the preferred arrangement according to the present invention the plumbing is free to extend beyond the connecting end of a pre-plumbed building element. The modification is preferably made to facilitate such extension but to also allow withdrawal back into the building element once the connection (of the plumbing) is completed and the element attached to the cam portion. This can be achieved by providing a coiled flexible and extendable section of plumbing which can be pulled free from the connecting end of the building element to allow attachment to the pipe section associated with the cam portion. This extending section of plumbing is preferably of a resilient plastics material, though may be metal, and ideally having a natural bias such that the coils are in close proximity or touching each other when in a rest state. Examples of such plastics are coiled air-line hoses used in spray painting and with air driven tools. These can be suitably modified and may be appropriate (e.g. using the appropriate materials to convey hot, cold, or mixed/tempered water) for use with plumbing.

Various types of connection systems including various types of quick-to-connect systems, through to more conventional threaded systems, can still be employed when using extendable pipe embodiments for the present invention.

5 Also included within the present invention are modified building elements such as previously described and/or for use in conjunction with cam portions such as described herein. These include hollow members which are hollow primarily at or near the connection point to the cam portion, through to tubular structures. Both closed and open structures are envisaged, with open structures including tubular members with removed portions which may extend along only part or all of the length of the member.

10 It is also envisaged that the building elements need not be straight and long, though may also include curved and variously configured arrangements, through to pre-assembled structures.

Both building elements intended to house plumbing and services, through to those which house nothing, may be used and included within the scope of the present invention. Those which carry services may be pre-plumbed, or pre-wired etc. Various types of connection  
15 systems may be used for services other than plumbing. The same principles as described above for plumbing may be used though with connection systems appropriate for the type of services involved. It is envisaged that most other services will be of an electrical and will tend to (in a bathroom situation) constitute power sources, or control signal sources for associated equipment such as thermostats, flow control, heating devices, sensors, manual or  
20 electronic control pads, etc.

Construction of a bathroom structure such as a shower enclosure can proceed, when the present invention is employed, in a number of manners. It is envisaged that embodiments of the present invention can cater for the various types of installation procedures adopted and performed throughout the world, as the system does not require access to the interior or  
25 underside of the surface itself providing the various services clear the surface or are otherwise accessible for connection. Accordingly the present invention is suitable for retrofitting as well as being integrated at an earlier stage of construction. It is also envisaged that the majority of embodiments allow for connection substantially without tools, which simplifies the secure attachment of members to cam portions which have already been  
30 fastened to the surface. If the cam portions are, in case of a shower enclosure, installed at the

factory (i.e. pre-plumbed) then the time taken by the plumber to install such plumbing is substantially eliminated, and the subsequent erection of the members is simplified. This makes it very easy for subsequent trades people, or the resident, to subsequently install various building elements and/or structures. It is envisaged that the arrangement of the present invention may also be used for mounting other articles within the house, and particularly where provision for the introduction of services must be made at the attachment point.

It is also envisaged that the cam portion may be modified to interact with shower receptors, bathtubs, and bases for other structures etc. These trays and components may be fabricated to include suitable mounting points for a cam portion according to the present invention. These may also include locating lugs or recesses which complement lugs and recesses which may provided on the cam portion. This can help the secure and precise placement of the cam portions, as well as ensuring their correct orientation – particularly when other components (such as shower doors and panels) are to be fitted at precise orientations to the member attached to the cam portions.

It should be appreciated a variety of different embodiments, uses, and applications of the present invention exist, even within the ambit of bathroom structures. Several specific embodiments for the present invention will now be given by way of example only, to help better describe and define the present invention.

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## DESCRIPTION OF DRAWINGS

- Figure 1 is a partially exploded diagrammatic view of a preferred embodiment of present invention showing the connection of an embodiment of a pre-plumbed hollow member to an existing surface,
- 25 Figure 2 is a partial perspective diagrammatic view of the interacting flange portions on the cam and engaging portions,
- Figure 3 is a partially cut away side view of an alternative embodiment of a cam portion interacting with an engaging portion insert on the inside of an embodiment of a building element,

- Figure 4 is a side diagrammatic view of an alternative embodiment of a cam portion,
- Figure 5 is a perspective diagrammatic view of an embodiment of a cam portion such as used in figure 1,
- Figure 6 is a perspective diagrammatic view of an embodiment of an annular engaging portion such as used in Figure 1,
- Figure 7 is a side diagrammatic view of a capping piece including a cam portion,
- Figure 8 is an alternative embodiment of a capping piece with a separable cam portion,
- Figure 9 is a side diagrammatic view of an interlocking member for joining hollow members, fashioned from a plurality of cam portions,
- Figure 10 is a side diagrammatic view of a cam portion used for connecting hollow members at a predetermined angle from the surface, and
- Figure 11 illustrates the preferred types of bayonet action according to the present invention.

#### DESCRIPTION OF PREFERRED EMBODIMENT

- A preferred embodiment of the present invention ideally realises a plurality of preferred features, which may be drawn from the following list. Various embodiments may realise different combinations of these preferences:
- 1) The engaging portion referred to as a cam is preferably attached, connected, or integrated with the supporting surface (e.g. floor, wall, shower receptor, bath tub, etc.);
  - 2) The engaging portion referred to as the cam preferably has more than one flange portion which at least eclipse complementary features on the other engaging portion;
  - 3) The engaging portions interact with a bayonet type interaction;
  - 4) The required rotation for engagement is preferably less than  $360^\circ$ ;
  - 5) There is preferably resistance to rotation or disengagement once the engaging portions have been coupled;

- 6) The engaging portions have provision for the passage of plumbing and services therethrough;
- 7) Once the engaging portion referred to as the cam has been fastened or otherwise affixed to the supporting surface, preferably hidden plumbing and services are accessible from the exposed face(s) of the cam engaging portion;
- 8) In pre-plumbed building elements, preferably the connecting of plumbing is through a pull down section or plumbing or services which can be extended from the building element for connection to plumbing or services associated with the alternate (affixed) engaging portion to be made;
- 9) The pull down section of plumbing or services is preferably biased to retract to within the building element;
- 10) The connection of the engaging portions is substantially hidden from view in the connected arrangement;
- 11) The arrangement preferably allows for both accurate vertical and horizontal positioning of the building element, and stability of connection with respect to movement in the vertical and horizontal directions, and preferably also against pivoting from the vertical about the connection point;
- 12) The engaging portion referred to as the cam portion is preferably a separate component (or assembly) though may also be designed to be an integral component of the supporting surface.

Figure 1 illustrates a preferred embodiment of the present invention. Shown in Figure 1 is an installed plumbing fitting (1) terminating a supply pipe (2). This is a standard flanged terminating elbow as is commonly used within wall cavities and other structures for supplying water to subsequently attached fittings. Co-operating with the elbow (1) is a threaded adaptor portion, generally indicated by arrow 3, which threads into the threaded female portion (4) of elbow (1). At the top end (5) of adaptor (3) is an appropriate fitting for connector (6) of the internal plumbing generally indicated by arrow 7. Preferably this is a quick-to-connect connection arrangement such as a "John Guest – trade mark" fitting. This adaptor (3) is generally fitted to the elbow (1) prior to subsequent installation of the other components.

The cam portion (10) is also visible. This has a substantially hollow interior (arrow 11) allowing it to be slid over the adaptor (3). The locating pin (12), which may be broken free when not required, helps the correct positioning and/or alignment (rotationally) of the cam portion (10) during fitting. The cam portion is lowered onto the surface (13), which may represent a floor structure, lip or mounting point on a shower tray, bath tub surround, or a variety of other anchoring surfaces. Mechanical fasteners (14) are used to fasten the cam portion (10) to the surface (13) or to the flanged elbow. An adhesive sealant may additionally be used around the base of the cam portion (10) as normal trade practice dictates.

- 10 The cam is disc-like in appearance though outwardly extending flange portions (15) are present at the top of the cam portion (10). Preferably there are such outwardly extending flange portions which interact with similar flange portions (23) on the engaging portion (20).

- The member (30) is shown in Figure 1 already attached to engaging portion (20). Its cross-section may vary according to user choice, and include "O", oval, "D", "C", "U", and "V" as preferred profiles, as well as changing profiles along its height. For this example a circular cross-sectional profile is described for simplicity. Bolts or other mechanical fastenings (21) are used to secure the engaging portion (20) to features (31) (e.g. cylindrical features such as screw pipes) on the inside of the member's wall. Locating tabs (32) may be provided to help position and locate the walls of member (30). It should also be noted that the arrangement may be modified slightly so that once connected, the engaging portion is recessed entirely (and hence fully hidden) within the member (30).

- The annular engaging portion (20) is also hollow in its middle to allow plumbing, and/or electrical services therethrough. Extending radially inwards into this cavity/aperture (22) are flange portions (23a, b) which interact with the flange portions (15) on the cam portion. These are positioned and sized commensurately, to the flange portion (15) in the described embodiment of a cam portion.

- The substantially hollow member (30) of Figure 1 includes a number of lateral body jets (33) (though could be substituted with shower spray devices – such as fixed or handheld roses – mixing valves, and faucets) which are pre-plumbed within the member (30). At the bottom of this internal plumbing (7) is a flexible coiled section pipe (34), preferably of a plastics

material. This should be resilient so that connector piece (6) can be withdrawn downwardly from the free end of the engaging portion (20).

The next step in method of installation is to extend the connector piece (6) and attach it to complementary end piece (5) of adaptor (3). The assembly comprising of the hollow member (30), its plumbing, and engaging portion (20) can then be lowered downwardly over the fastening cam portion (10). This should be positioned (i.e. rotated) so that flanges (23) do not interfere with flanges (15) as the assembly is being lowered.

Once lowered, the assembly (30 et al) can be rotated so that flanges (23) and (15) engage with each other. This arrangement then secures the assembly (30 et al) from being removed from the cam portion (10). The assembly (30 et al) is then securely fastened to the surface (13) with no externally visible evidence of attachment.

It can be appreciated the method of attachment is very simple once the cam portion (10) has been fastened to surface (13), and engaging portion (20) has been fastened to the assembly (30). It is envisaged that such prior attachment (engaging portion (20) to member (30), and cam portion (10) to surface (13)) will have been completed at an earlier stage by the various trades persons, or during the manufacturing and assembly process (for pre-plumbed embodiments). When the plumber or resident is ready to finally erect the member (30), all that is required is the simple coupling of adaptor portions (5) & (6), and a bayonet type fitting action of the member over the fastened cam portion (10). This arrangement makes it substantially easier for in the instance where not all trade persons are present on site at the same time. The use of fitting templates for the accurate positioning of the cam portions (10) can also facilitate the ease of installation for trade persons present at earlier stages, and ensure a more accurate subsequent fitting of components during final erection of a shower enclosure, partitioning, etc.

Figure 2 shows the interacting flange portions in more detail. Visible on the flange portion (15) of cam portion (10) is a downwardly directed projection (40). Assuming, for this example, rotation in a clockwise direction for fitting and securing, the leading edge (41) maybe inclined while the trailing edge (42) is substantially perpendicular to the bottom face of flange portion (15). As can be appreciated, this ratchet type design will resist anti-clockwise turning should projection (40) extend into a recess (43) such as is shown on flange

portion (23) of the engaging portion (20). Again one face (44) of recess (43) is substantially vertical to resist anti-clockwise turning once the projection (40) is present within recess (43). This provides a rotation resisting function resisting subsequent rotation and removal of the attached member (30) and associated components. The leading and trailing angles can be varied to suit the requirements of the user.

Even where a rotation resisting provision is not made, the provision of interacting features (such as projection (40) and recess (43)) may be desirable to help ensure the correct degree of rotation during assembly. Other methods including stops and raised end projections (on the flange portions and elsewhere within the various components) may also be considered to achieve the same effect so as to ensure that connected components end up in the correct rotational position.

In Figure 2, the inwardly directed flange is provided on the interior wall (29) of an engaging portion comprising an insert (20) which can be positioned within member (30). An insert arrangement is shown in Figure 3 with barb (37) interacting with recesses or apertures (29) to help maintain it in place. A plurality of such interacting features may be used to help retain insert (29). Other fixing and fastening methods may also be considered.

In Figure 3 the cam portion (10) also includes a base foot (50) which helps tidy the end of hollow member (30). The foot (50) rests on the surface into which the cam portion (10) is cast. Downwardly extending anchors (49) are embedded into the floor, the cam portion being put into place when the floor is cast. A washer type seal (36) is also provided.

Figure 4 illustrates a further embodiment of the present invention which includes multiple disc-like portions to strengthen the connection against pivoting of the attached building element (30) with respect to the cam fixture. This option will not always be required. Here in addition to the disc-like portion (54) of the cam portion is an additional disc-like portion (55). This upper disc-like portion may include outwardly extending flanges (not shown) which also interact with inwardly directed flange portions on the hollow member or its insert. In the embodiment of Figure 4, no such features are provided, with the outer periphery of the annular disc-like portion (55) configured to bear against the inside of the walls (30) of the member. Removed portions extending inwardly from the periphery (not



visible in the diagram) should be provided to allow this portion to permit the flange portions (23) on the engaging portion to travel past.

One wall (30) of the hollow member (which is configured to support a glass partition) is shown (though this has not been completely lowered into place) to illustrate how the outer periphery of portion (55) bears against the inside. It can be appreciated that the two points of contact further stabilises the arrangement and helps prevent pivoting of the hollow member (30) with respect to the fastened cam fixture.

As a variation, the upper disc-like portion (55) and the separating body portion (56) may be removable/attachable to portion (54). This may be by means of a threaded or other arrangement. It is further possible that additional such an element (58) may be stacked sequentially one upon the other to extend the height of the cam fixture and thus alter its relationship with the building element (30).

Figure 5 illustrates an embodiment of the cam such as used in Figure 1. This is a top plan perspective view and illustrates the main body (60) of the cam portion (10) including outwardly directing flange portions (15). Apertures (61) allow for fastening screws or bolts to pass therethrough.

In Figure 5 the central portion (63) has a removable plate which may be punched or knocked out should it be necessary to pass services therethrough. As can also be seen, the outer flanges (15) are distanced from the base of the cam portion by a distance (64). This allows provision for the flange portions (23) of the engaging portion to be positioned underneath, and also to compensate for the thickness of any seals (36) which are used during installation.

Three outwardly directing flange portions (15) as shown though more may be provided. Preferably three is the minimum number of such outwardly directed flange portions. While these may be spaced equidistantly about the periphery, non-equidistant spacing may be preferable to ensure that the attached member can only be positioned and attached in one rotational orientation. This will help prevent members being fitted incorrect orientations – a particular problem where hinges or jets or supports are provided on the column.

Figure 6 illustrates a preferred embodiment of an engaging portion (20) such as used in the embodiment of Figure 1. As can be seen, the primary body (70) of the engaging portion is

substantially annular in appearance. Three inwardly directed flange portions (23) are present and again positioned to correspond with the position of the flanges (15) associated with the cam portion (10). Features (43) on the top face are visible which correspond with the locating projections and recesses visible in Figure 2.

- 5 Centring tabs (72) are distributed on the upper face of body (70) to correctly position the wall of the new hollow member (30) (see also Figure 1). Apertures (73) are provided for fasteners (21) to pass through and secure the annular engaging portion (20) to member (30). Open hollow tubular features of substantially 'C', 'D', 'U', or 'V' (other shapes can be considered) cross section are provided on the interior of the hollow member (30) and into  
10 which the fastening means (21) maybe screwed.

- The various components associated with the present invention may be constructed from different materials. Metals may be used though are preferably of a corrosion resistance material. Materials such as aluminium and its alloys, various stainless steels, bronzes and brasses, etc may all be employed. They may be fabricated by casting, machining,  
15 combinations of both, and/or by other suitable manufacturing processes. Such materials may be utilised for the cam portion and associated components, the engaging portion and associated components, as well as the hollow member (30).

- Other materials may also be considered. Plastic materials are especially suitable and again many are known which are suitable for casting, machining, and for various other fabrication  
20 techniques. High impact thermoplastic materials may be considered for use. Materials worthy of consideration include many nylons, polyurethanes, as well as composite materials, and resin based materials.

Seals and washers, provided, maybe manufactured from normally utilised materials for these types of components. Sealant materials (e.g. caulks etc.) may also be used.

- 25 The element (30) may be substantially constructed of one or more components, with the same choice of materials as the cam and the engaging portions being possibilities. However, other materials may also be considered, as well as different fabrication techniques. Where the element (30) is of substantially constant cross section, extruded lengths and sections may be considered. In the preferred embodiment of Figure 1, the member (30) is an extruded  
30 section of aluminium, though may be an alternative material, such as discussed above.

Figure 7 illustrates a further variation of the cam portion which constitutes a capping member. Most building elements according to present invention will also have a top or alternate end which may be open. If this is to be capped, it may be desirable to accomplish this without visible connection means. Figure 7 illustrates embodiment of a cap which, in its simplest form, represents substantially a cam portion such as illustrated in Figure 1 (as item 10) though without locating pin 12. Fastening apertures (61) (see Figure 5) may not be present either. Flange portions (82) (corresponding to flanges 15 in Figure 1) also provided on the main body (81) of the cam portion. An aesthetically pleasing and appropriate cover piece (83) is provided on the ultimate end of the body (81), which would normally be the end which would contact the floor or surface (13) in Figure 1.

The building element (not shown for simplicity in Figure 7) would also be modified to include an engaging portion (20) with which the capping piece can interact. Accordingly, substantially the same component may, with minimal (or no) modification, be used for fixing the hollow member to a surface, as well as for closing the alternate open end.

The variation in Figure 8 illustrates the embodiment of Figure 7 though where the cover piece (83) is separable from the primary body (81) of the cam portion (80). In this arrangement internal aperture (84) of the cam portion is threaded allowing the cap (83) to be screwed in by virtue of its projecting stem piece (86). In this arrangement the same cam portion can be used for both ends of the hollow section. As a further variation, the internal aperture (84) of the cam piece need not be threaded but instead the downwardly directed stem portion (86) can be configured to allow an interference fit, or another type of connection to maintain capping piece (83) in place.

Figure 9 illustrates an arrangement utilising the internally threaded cam portion (81) of Figure 8. If two of these (90, 91) are connected by a threaded tube or rod (92), the result is a connector enabling two sections of building element to be quickly connected one to the other. This increases the versatility of the cam portion and allows it to be used in a number of manners.

Figure 10 illustrates an embodiment of the cam fixture 100 which may be used for connecting elements 30 at an angle to the surface 13. Here the main hollow body portion 101 is inclined at an angle to the main base portion 102 which is also configured (103) to

seat the base of the member 30. These embodiments may be available in a variety of angles to suit different types of construction of enclosures, which will compensate for surfaces at different angles from the perpendicular or horizontal. Some angles (measured with respect to the surface) may be relatively shallow (e.g. 1.5 through to 5 degrees) and thus these fixtures may compensate for natural inclines in the surface for water drainage. In other instances they may be configured to follow the contour of an irregular or non-planar surface mounting position. This is likely to be where the cam portion is not fixed to a wall or floor, but to a tray, tub, or installed article.

Figure 11 illustrates in a conceptual schematic form the preferred types of bayonet action discussed earlier. Figure 11a illustrates the 'flat bayonet action' where overlapping components of the engaging components only start to overlap with each other when rotation occurs after linear positioning. Figure 11b represents the typical 'light bulb type' bayonet action where a guide element substantially prevents or limits relative rotation until linear positioning is completed. Figure 11c represents a 'helical bayonet action' in which rotation introduces a linear component to the relative movement of the engaging portions – such as drawing one portion down into the other.

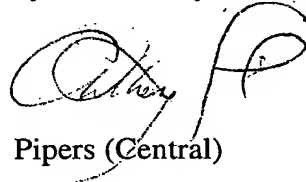
Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the spirit or scope of the present invention as described herein.

It should also be understood that the term "comprise" where used herein is not to be considered to be used in a limiting sense. Accordingly, 'comprise' does not represent nor define an exclusive set of items, but includes the possibility of other components and items being added to the list.

This specification is also based on the understanding of the inventor regarding the prior art. The prior art description should not be regarded as being an authoritative disclosure of the true state of the prior art but rather as referring to considerations in and brought to the mind and attention of the inventor when developing this invention.

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Smith Caulfield Limited  
by its Attorneys



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**ABSTRACT**

The invention focuses on method and apparatus for simply attaching various building elements to a surface (which may be finished) in a manner where the connection is substantially hidden after attachment. Applications include the erection of enclosures and partitions in bathrooms, showers and wet areas. As many of the members are hollow and route services, preferred embodiments allow for the passage of, and/or connection to, services such as plumbing from within the surface to which the element is attached and to within the member itself. The preferred method and apparatus comprise interacting cam and engaging portions allowing the element to be attached to the cam portion, once it has been secured in place, in a simple action such as typical of bayonet type connections.

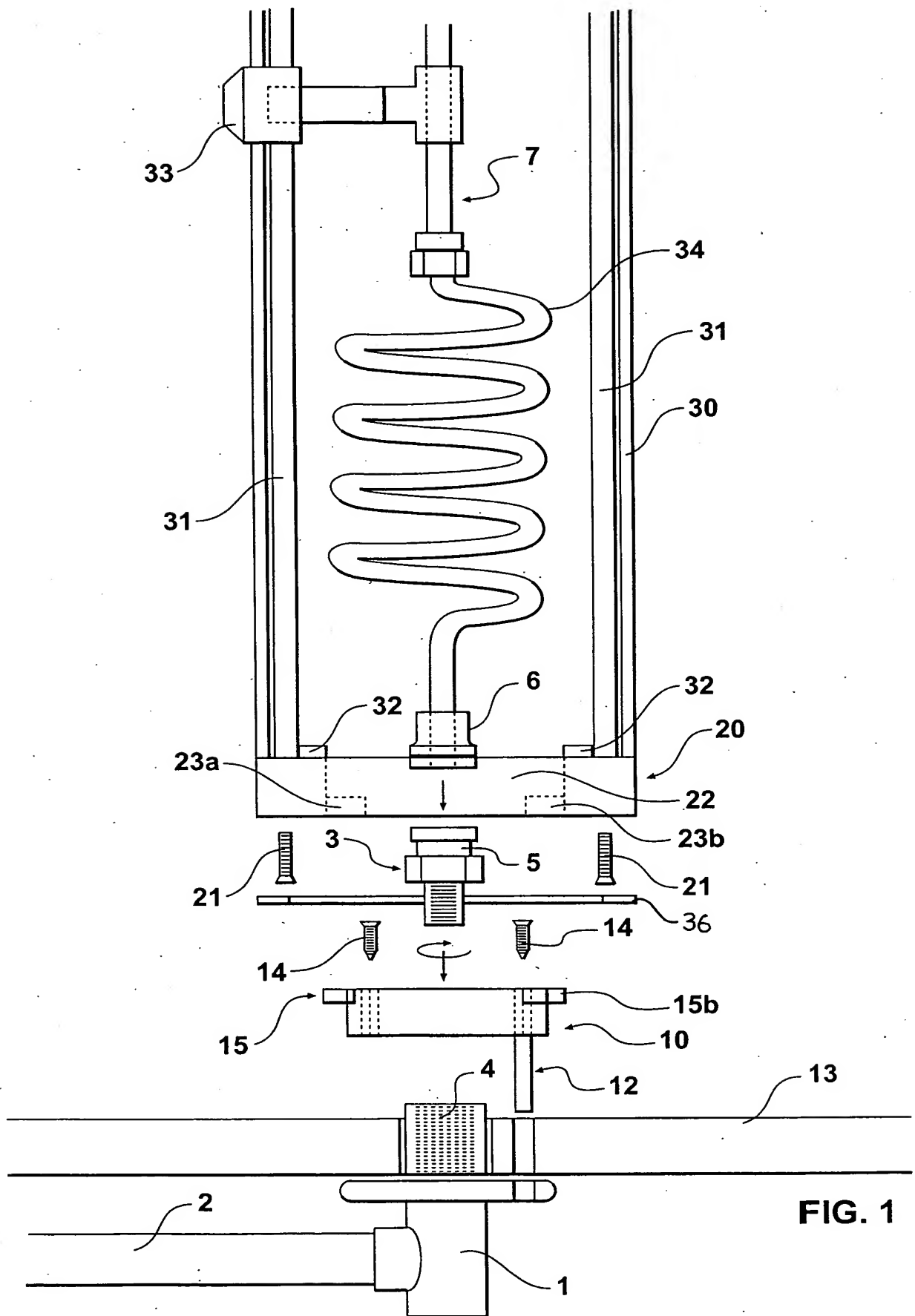
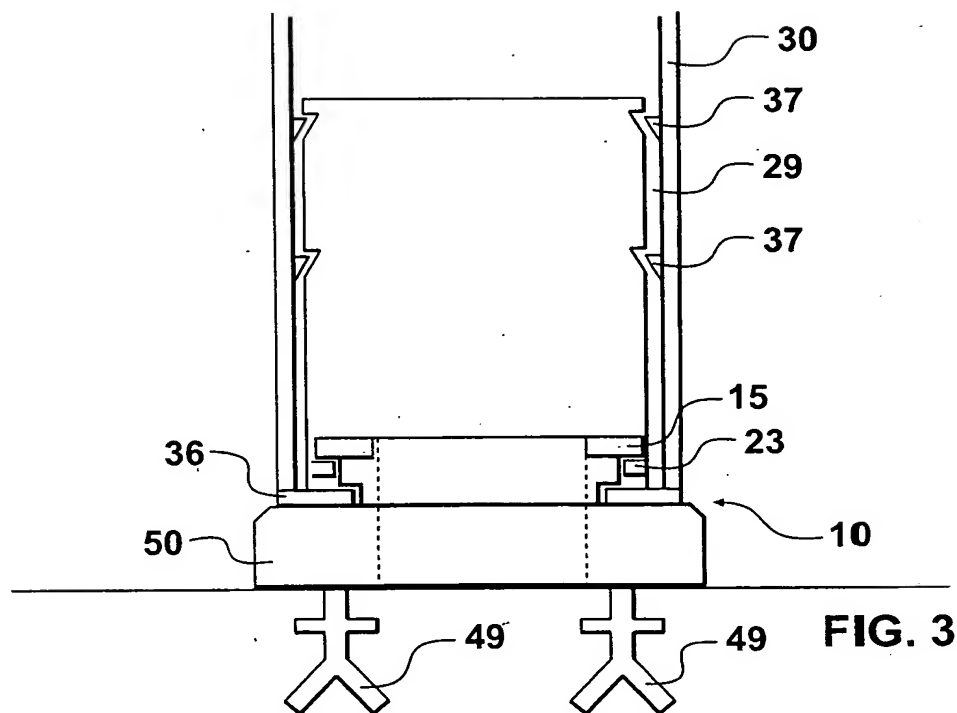
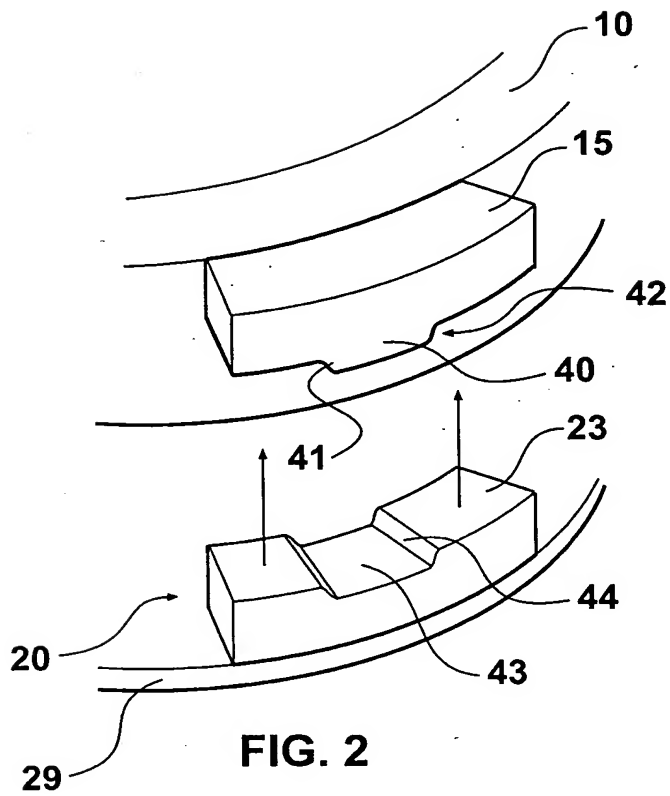


FIG. 1





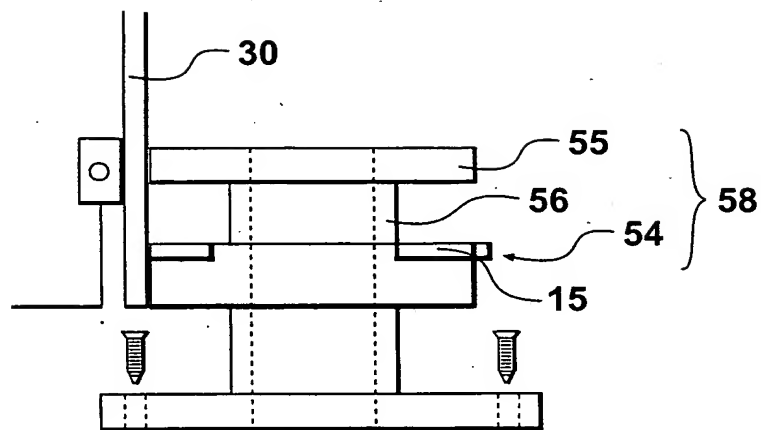


FIG. 4

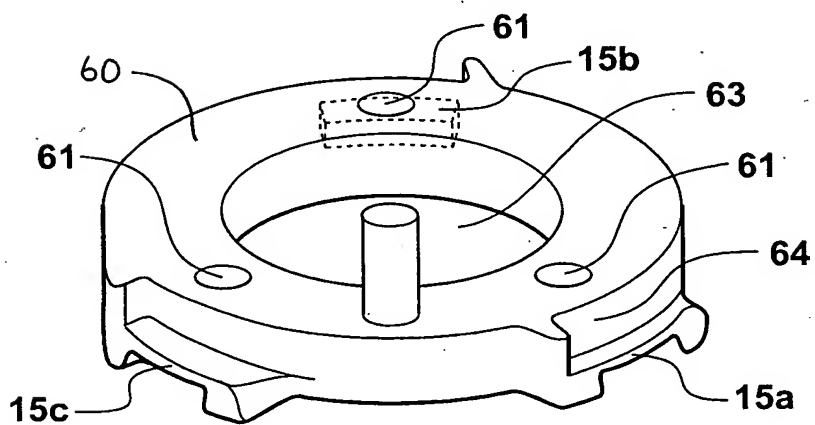
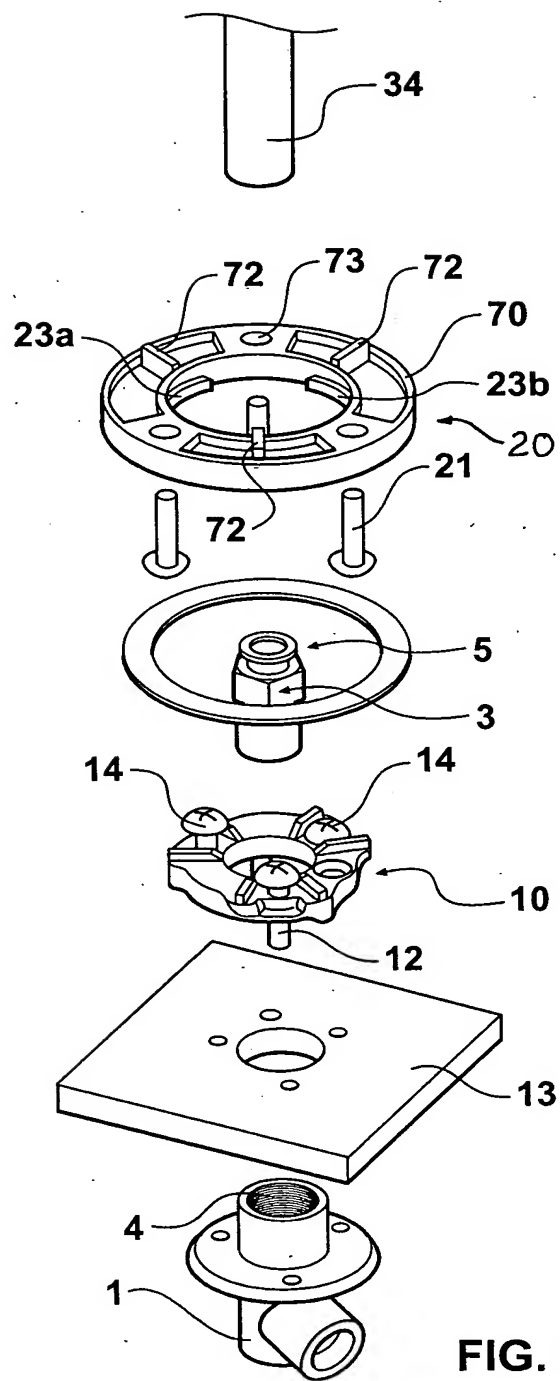


FIG. 5



**FIG. 6**

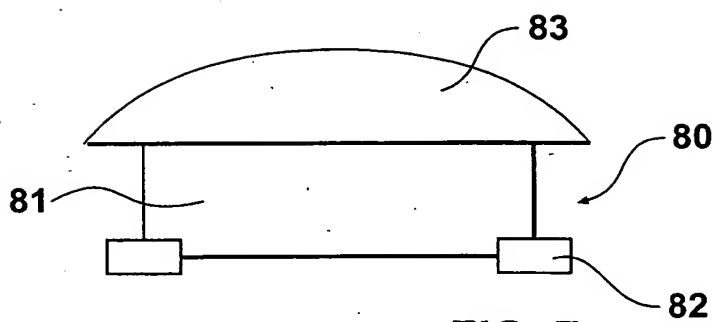


FIG. 7

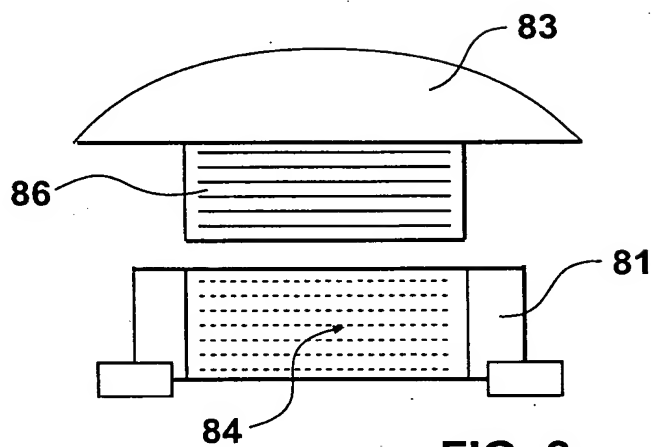


FIG. 8

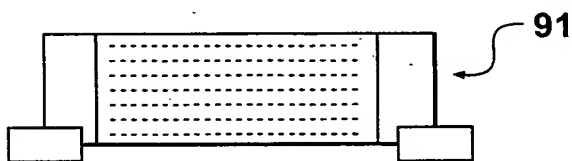
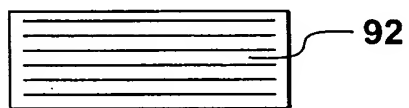
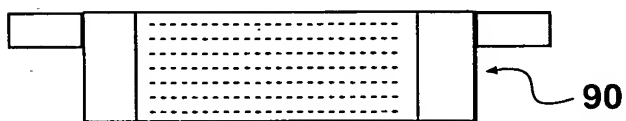


FIG. 9

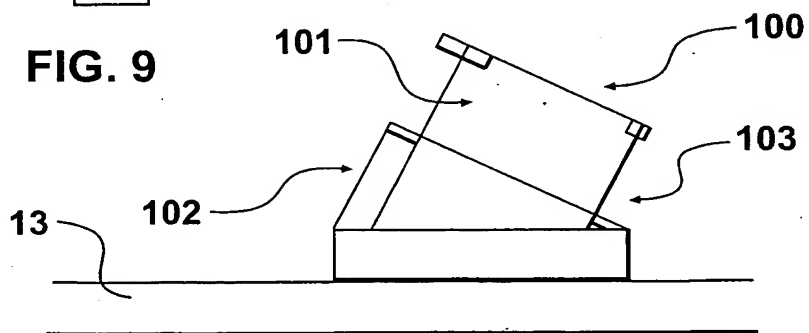
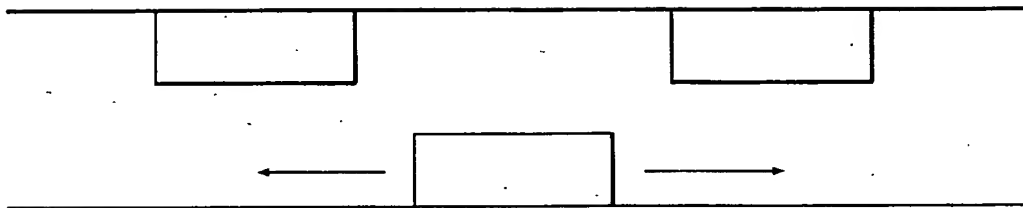
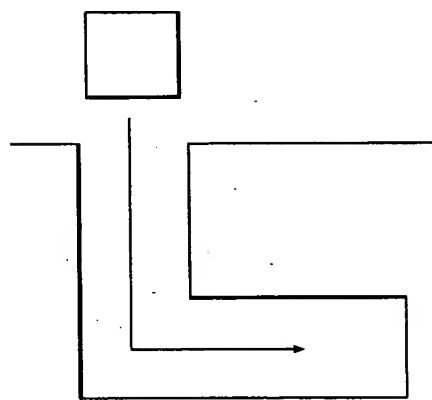


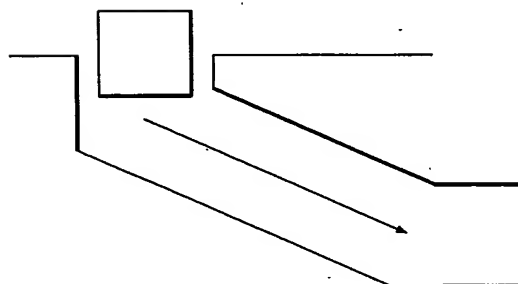
FIG. 10



**FIG. 11a**



**FIG. 11b**



**FIG. 11c**